

Base Hospital Contact: Required prior to transport for all cardiac arrest patients who do not meet criteria for determination of death per [Ref. 814](#).

1. For patients meeting [Ref. 814](#) Section I criteria for determination of death in the field – document Provider Impression as *DOA – Obvious Death*
2. Resuscitate cardiac arrest patients on scene ❶
3. Initiate chest compressions at a rate of 100-120 per min, depth 2 inches or 5 cm ❷
Minimize interruptions in chest compressions
4. Assess airway and initiate bag-mask-ventilation; escalate to advanced airway prn ❸❹ ([MCG 1302](#))
Supraglottic airway is the preferred advanced airway when indicated ❺
Monitor waveform capnography throughout resuscitation ❻
5. Administer high-flow **Oxygen** (15L/min) ([MCG 1302](#))
6. Initiate cardiac monitoring ([MCG 1308](#))
Briefly assess rhythm every 2 minutes, minimizing pauses, or continuously via rhythm display technology ❼

V-FIB/PULSELESS V-TACH: ❸

7. **Defibrillate biphasic at 200J** immediately or per manufacturer's instructions
Repeat at each 2-minute cycle as indicated
8. Establish vascular access ([MCG 1375](#))
Establish IO if any delay in obtaining IV access
9. Begin **Epinephrine** after defibrillation x2:
Epinephrine (0.1mg/mL) administer 1mg (10mL) IV/IO
Repeat every 5 min x2 additional doses; maximum total dose 3mg ❾

CONTACT BASE to discuss additional epinephrine doses in cases where it may be indicated due to recurrent arrest or conversion to PEA

10. After defibrillation x3 (for refractory or recurrent V-Fib/V-Tach without pulses):
Amiodarone 300mg (6mL) IV/IO
Repeat **Amiodarone 150mg (3mL) IV/IO** x1 prn after additional defibrillation x2, maximum total dose 450mg

ASYSTOLE/PEA:

11. **Epinephrine (0.1mg/mL) administer 1mg (10mL) IV/IO**

Repeat every 5 min x2; administer first dose as early as possible; maximum total dose 3mg ⑨

CONTACT BASE to discuss additional epinephrine doses in cases where it may be indicated due to refractory PEA or recurrent arrest

12. Consider and treat potential causes ⑩

13. **Normal Saline 1L IV/IO rapid infusion**

Repeat x1 for persistent cardiac arrest

For suspected hypovolemia, administer both liters simultaneously

14. For patients with renal failure or other suspected hyperkalemia: ⑪

Calcium Chloride 1gm (10mL) IV/IO

Sodium Bicarbonate 50mEq (50mL) IV/IO

TERMINATION OF RESUSCITATION:

15. If resuscitative efforts are unsuccessful and the patient does not meet ALL criteria for Termination of Resuscitation in [Ref. 814, Section II.A.](#), **CONTACT BASE** to consult with Base Physician ⑧

RETURN OF SPONTANEOUS CIRCULATION (ROSC): ⑫ ⑬

16. Initiate post-resuscitation care immediately to stabilize the patient prior to transport ⑭

17. Establish advanced airway prn if not placed prior ⑤

18. Raise head of stretcher to 30 degrees if blood pressure allows, otherwise maintain supine

19. Continue low volume ventilations at 10 per minute ⑮

20. Immediately resume CPR if patient re-arrests

21. For SBP < 90 mmHg:

Normal Saline 1L IV/IO rapid infusion

If no response after **Normal Saline 250mL**, or worsening hypotension and/or bradycardia:

Push-dose Epinephrine – mix 9mL Normal Saline with 1mL Epinephrine 0.1mg/mL (IV formulation) in a 10mL syringe. Administer **Push-dose Epinephrine (0.01mg/mL) 1mL IV/IO** every 1-5 minutes as needed to maintain SBP > 90mmHg ⑰

CONTACT BASE concurrent with initial dose of **Push-dose Epinephrine**

22. Perform 12-lead ECG and transmit to the SRC ¹⁶
23. Check blood glucose
For blood glucose < 60mg/dL
Dextrose 10% 125mL IV and reassess
If glucose remains < 60mg/dL, repeat 125 mL for a total of 250 mL
24. For suspected narcotic overdose: ¹⁸
Naloxone 2-4mg (2-4mL) IV/IO/IM/IN (For IN, 1mg per nostril or 4mg/0.1mL IN if formulation available)
Maximum dose all routes 8 mg
25. Contact **Public Health 213-989-7140** for all submersion incidents involving pools or spas after transfer of patient care in the emergency department or upon termination of resuscitation in the field (this requirement is effective 10/1/21). ¹⁹

SPECIAL CONSIDERATIONS

- ❶ Maintaining perfusion with high-quality CPR throughout resuscitation is essential to ensuring good patient outcome. Transporting the patient in cardiac arrest causes interruptions in CPR and reduces CPR quality. Patients who are resuscitated until ROSC on scene have higher neurologically intact survival.
- ❷ Chest compressions are the most important aspect of cardiac arrest resuscitation. Maintaining continuous chest compressions should take priority over any medication administration or transport.
- ❸ Hyperventilation reduces venous return and worsens patient outcomes. Both continuous and interrupted (30:2) compressions/ventilations are acceptable. Regardless of ventilation method used, ventilations should be no more frequent than 10 per minute with a volume of 400-600mL depending on patient size, just enough to see chest rise. Care should be taken to avoid hyperventilation, especially with an advanced airway in place.
- ❹ Bag-mask ventilation (BMV) with a viral filter is the preferred initial method of airway management. BMV in cardiac arrest has been associated with improved patient outcomes. Supraglottic airway (SGA) placement should be performed if BMV is ineffective and otherwise deferred until initial resuscitation priorities are complete (i.e., at least 2 defibrillations for shockable rhythms and first dose of epinephrine IV for nonshockable rhythms). Intubation should not be performed until after return of spontaneous circulation (ROSC) unless ventilation with BMV and SGA is ineffective and/or contraindicated. For all patients, consider placement of an advanced airway prior to transport to facilitate ventilations en route and during patient transfers.
- ❺ SGA is the preferred advanced airway unless specifically contraindicated given studies showing improved outcomes compared to endotracheal intubation. SGAs are more rapid to place without interruption in chest compressions. Paramedics should use judgment based on patient characteristics, circumstances, and skill level when selecting the advanced airway modality.
- ❻ ETCO₂ should be > 10 with a “box-shaped” waveform during effective CPR. A flat or wavy waveform or ETCO₂ < 10 may indicate ineffective compressions or airway obstruction. A sudden increase in ETCO₂ is suggestive of ROSC. The waveform can also be used to confirm ventilation rate if an advanced airway or asynchronous ventilation with continuous compressions is used.
- ❼ If you are able to observe the underlying rhythm during compressions via rhythm display technology, do not pause for the rhythm check. In order to minimize pauses in chest compressions, pulse checks should only be performed during rhythm checks when there is an organized rhythm with signs of ROSC, such as normal capnography or sudden rise in capnography.
- ❽ Patients in persistent cardiac arrest with refractory V-Fib (persistent V-Fib after 3 unsuccessful shocks) or EMS-witnessed arrest of presumed cardiac etiology may have a good outcome despite prolonged resuscitation. For these patients, resuscitation may be continued on scene for up to 40 minutes, as long as resources allow, in order to maximize the chances for field ROSC, which is strongly associated with improved survival with good neurologic outcome. Earlier transport may be initiated for providers using a mechanical compression device who are transporting a patient to a STEMI Receiving Center (SRC) for extracorporeal membrane oxygenation (ECMO) initiation.
- ❾ Epinephrine may improve outcomes if given early in non-shockable rhythms, but can worsen outcomes

Treatment Protocol: CARDIAC ARREST

Ref. No. 1210

early in shockable rhythms, where defibrillation is the preferred initial treatment. Epinephrine is most likely to be effective if it is given early and after chest compressions have begun. The likelihood of meaningful survival declines after three (3) doses of epinephrine. Resuscitation should continue focused on quality CPR, defibrillation, and identifying reversible causes. Additional doses of epinephrine should only be administered with Base order.

- ⑩ Potential causes that can be treated in the field include hypoxia, hypovolemia, hyperkalemia, hypothermia, toxins, and tension pneumothorax. Hypoglycemia is a very rare cause of cardiac arrest and should not be assessed until after ROSC. If environmental hypothermia is suspected, resuscitation efforts should not be abandoned until the patient is re-warmed, or after consultation with the Base Physician.
- ⑪ Treat suspected hyperkalemia with calcium and sodium bicarbonate as soon as possible. The sooner it is administered, the more likely it is to be effective. Flush the line between medication administration.
- ⑫ Post cardiac arrest patients are at high risk for re-arrest during transport. Fluid resuscitation, vasopressor support, and avoidance of hyperventilation are recommended to decrease the risk of re-arrest.
- ⑬ All cardiac arrest patients, with or without ROSC, shall be transported to the most accessible open SRC if ground transport is 30 minutes or less, as initiation of targeted temperature management and early coronary angiography in a specialty center have been shown to improve outcomes.
- ⑭ Approximately 50% of patients will re-arrest shortly after ROSC. Anticipate this decline as the epinephrine administered during the resuscitation begins to lose effect. Initiating post-resuscitation care, including fluids and preparing push-dose epinephrine for use as needed, can prevent re-arrest. These steps should be initiated immediately after ROSC to stabilize the patient for approximately 5 minutes prior to transport to reduce chances of re-arrest en route.
- ⑮ ETCO₂ can help guide your ventilation rate; target ETCO₂ 35-45 mmHg. Just after ROSC, the ETCO₂ may be transiently elevated. This will decrease appropriately with ventilation and does not require hyperventilation to normalize. Persistently elevated ETCO₂ and/or “sharkfin” waveform may indicate respiratory failure as cause of the cardiac arrest. Falsely low ETCO₂ measurements can occur if there is a leak with BMV or shock.
- ⑯ An ECG with STEMI after ROSC requires notification of ECG findings to the SRC.
- ⑰ **Push-dose Epinephrine** is appropriate for non-traumatic shock including cardiogenic shock. Additional doses beyond 10mL may need to be prepared for prolonged transports.
- ⑱ Narcotic overdose should be suspected in cases where there is drug paraphernalia on scene or there is a witness report. Pinpoint pupils may be present, but hypoxia during cardiac arrest can cause mydriasis (dilated pupils) instead.
- ⑲ EMS is assisting the Department of Public Health (DPH) in promptly investigating fatal or nonfatal drownings at public pools or spas in order to ensure safety can be verified before reopening. Contacting the on-call DPH officer will allow timely investigation of these incidents and prevent future incidents.